3.5 Performance Management Activities

3.5.1 Operations Support Scenario

3.5.1.1 Scenario Description

This scenario describes the steps that are executed in providing operations support to solve a performance problem. In this example, there are a variety of different ECS personnel involved. The definitions and roles of the participating staff members are taken from the Maintenance and Operations Manual for the ECS Project 607-CD-001-001) and/or The Maintenance and Operations Configuration Management Plan for the ECS Project. The personnel involved are, the Computer Operator, the Instrument Team Analyst, DAAC Data Specialist, Operations Supervisor/ Resource Manager, Sustaining Engineer and the Production Monitor. At the start of the scenario the predefined threshold to monitor the space available for each disk has been exceeded on host DMGHW-GSFC-2. The system then sends a warning message to the Computer Operator indicating the free space on the disk has exceeded the threshold. The Computer Operator then monitors the HP OpenView to view the severity of the problem. The Computer Operator then generates and submits a Discrepancy Report (DR) outlining the problem. The Operations Supervisor/Resource Manager receives/reviews the DR and assigns it to the Sustaining Engineer. The Sustaining Engineer, with the aid of past experiences and HP OpenView, investigates the problem. The Sustaining Engineer upon investigation comes to the conclusion that the PGE CER041297112004A (The CERES Subsystem 4, Cloud Retrieval (release 2.1)) is using about ten times more disk space than usual. The Production Monitor then in coordination with the Sustaining Engineer and by reviewing previous logs determine that the PGE is using ten times more disk space than usual. The Sustaining Engineer contacts the DAAC Data Specialist to investigate the anomalous PGE. The Sustaining Engineer calls the Operations Supervisor/Resource Manager and the computer operator to report his findings. The Sustaining Engineer updates the DR and submits it to the Operations Supervisor/Resource Manager. The Operations Supervisor/Resource Manager reassigns the DR to the DAAC Data Specialist. The DAAC Data Specialist calls an Instrument Team Analyst to discuss the situation. The Instrument Team Analyst recommends the termination of the PGE to the DAAC Data Specialist. The DAAC Data Specialist notifies the Production Monitor and the Production Monitor terminates the PGE. The DAAC Data Specialist updates and submits the DR. The DAAC Data Specialist sends the data to the Instrument Team Analyst for further investigation and The Production Monitor places a hold on future execution of the PGE.

3.5.1.2 Frequency

Although this particular scenario may only happen once a month, it is assumed that Operations Support will occur daily.

3.5.1.3 Assumptions

The assumptions underlying this scenario are as follows:

1. The thresholds for disk space utilization have been established.

2. The notification mechanisms for when an established threshold has been reached are set.

3.5.1.4 Components

Figure 3.5.1.4-1 indicates the interaction between the DAAC personnel and the ECS subsystems.

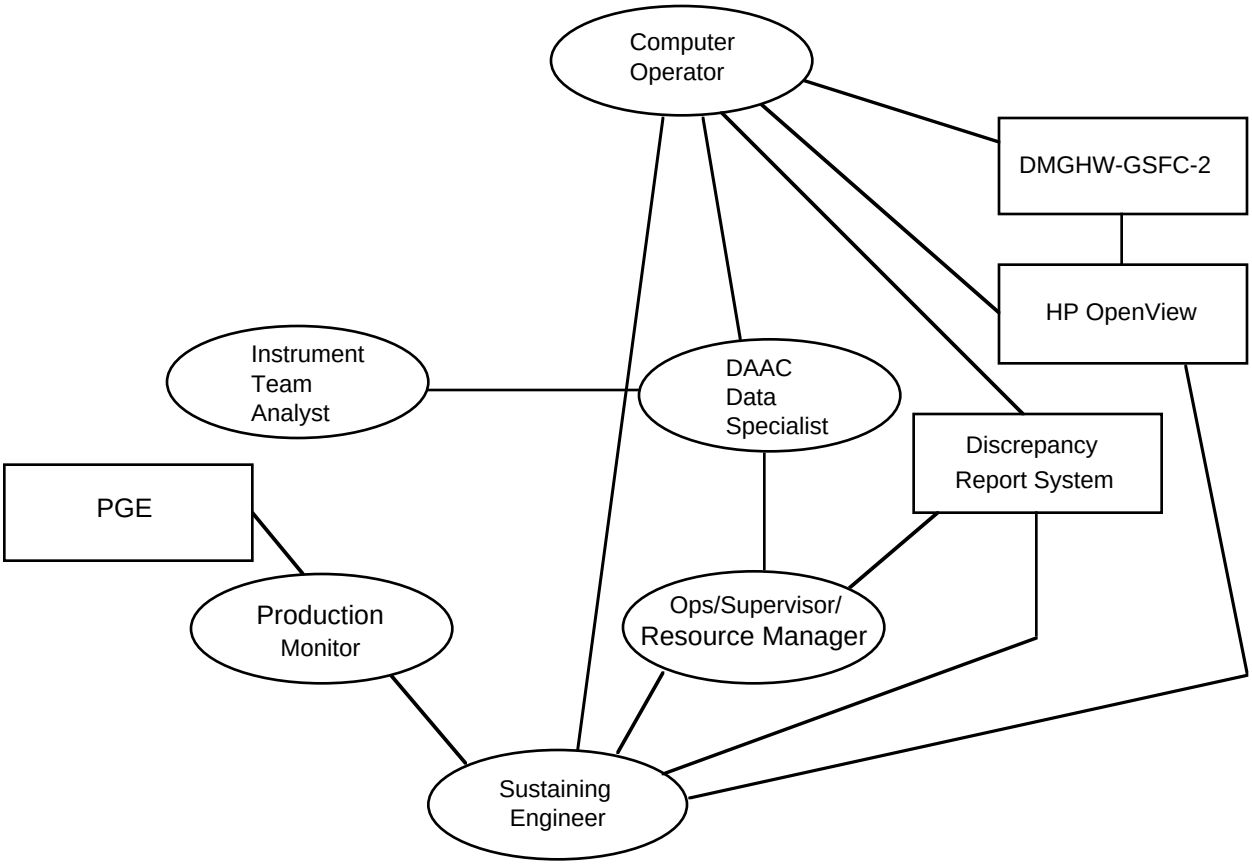


Figure 3.5.1.4-1. Operations Support Scenario Components

3.5.1.5 Preconditions

The following preconditions are assumed for this scenario.

1. The event thresholds have been predefined.

3.5.1.6 Detailed Steps of Process

Table 3.5.1.6-1 represents the details of this scenario. The times and duration given are approximate.

Table 3.5.1.6-1. Operations Support Process (1 of 4)

Step	Duration	User	Operator Action	System	Figure
1	1 Time = 1000			The free space available on DMGHW-GSFC-2 has fallen below the threshold.	
2	<1 Time = 1001			System sends a warning message to the computer operator screen	
3	<1 Time = 1002		Computer Operator receives and acknowledges the warning message.		
4	3 Time = 1003		Computer Operator views the HP OpenView GUI.		3.5.1.6-2
5	<1 Time = 1006		Computer Operator double clicks on the GSFC Icon on HP OpenView	HP OpenView goes down to the next submap.	3.5.1.6-2
6	<1 Time = 1007		Computer Operator clicks on the DMGHW-GSFC-2 Icon.	HP OpenView highlights the Icon.	3.5.1.6-3
7	<1 Time = 1008		Computer Operator selects the browse MIB option to determine the problem.	HP OpenView initialize the various MIBs.	
8	<1 Time = 1009		Computer Operator looks at the free space MIB and notices that it has been running at over 80% for the last 30 minutes.	HP OpenView shows information relating to free space.	
9	<1 Time = 1010		Computer Operator initializes the Discrepancy Report (DR) System.	DR system initializes.	3.5.1.6-1
10	3 Time = 1011		Computer Operator generates a DR outlining the problem.		3.5.1.6-1
11	<1 Time = 1014		Computer Operator submits the DR.	System transfers the DR to the Operations Supervisor/Resource Manager	3.5.1.6-1

Step	Duration	User	Operator Action	System	Figure
12	3 Time = 1015		The Operations Supervisor/Resource Manager receives the DR, assigns it a priority and assigns the investigation to the Sustaining Engineer (SE).		3.5.1.6-1
13	3 Time = 1018		The Sustaining Engineer views the HP OpenView GUI.		3.5.1.6-2
14	<1 Time = 1021		Sustaining Engineer double clicks on the GSFC Icon on HP OpenView	HP OpenView goes down to the next submap.	3.5.1.6-2
15	<1 Time = 1022		Sustaining Engineer clicks on the DMGHW-GSFC-2 Icon.	HP OpenView highlights the Icon.	3.5.1.6-3
16	<1 Time = 1023		Sustaining Engineer selects the browse MIB option to determine the problem.	HP OpenView initialize the various MIBs.	
17	<1 Time = 1024		Sustaining Engineer looks at the free space MIB and notices that it has been running at over 80% for the last 30 minutes.	HP OpenView shows information relating to free space.	
18	4 Time = 1025		Sustaining Engineer graphs the available data and notices a substantial increase of disk utilization during the production of PGE.	HP OpenView graph capabilities are used.	
19	15 Time = 1029		The Sustaining Engineer coordinates with the Production Monitor to determine what the average disk utilization for this PGE.		
20	4 Time = 1044		They determine that the PGE is using about ten times more disk space than usual		
21	10 Time = 1048		The Sustaining Engineer and the Production Monitor believe that there is a problem with the execution of the PGE. The DAAC Data Specialist is called in to investigate the anomalous PGE execution.		

Step	Duration	User	Operator Action	System	Figure
22	2 Time = 1058		The Sustaining Engineer calls the Operations Supervisor/Resource Manager and computer Operator and reports his findings.		
23	3 Time = 1100		The Sustaining Engineer updates the DR	Initializes the DR system.	3.5.1.6-1
24	<1 Time = 1103		The Sustaining Engineer sends the updated DR to the Operations Supervisor/Resource Manager and computer Operator.	Submits the updated DR.	3.5.1.6-1
25	3 Time = 1104		The Operations Supervisor/Resource Manager reassigns the DR to the DAAC Data Specialist.	The assignment field is modified and the DR is redistributed.	
26	15 Time = 1107		The DAAC Data Specialists calls an instrument team analyst and discusses the situation.		
27	45 Time = 1122		The instrument team analyst suspects that the PGE has internally detected an error and has shifted to Debug mode.		
28	3 Time = 1212		The Instrument team analyst recommends termination of the PGE to the DAAC Data Specialist.		
29	5 Time = 1215		The Production Monitor terminates the PGE.	PGE is terminated.	
30	10 Time = 1220		Computer Operator saves the associated disk file onto temporary storage.	Disk file is backed up.	
31	3 Time = 1230		The DAAC Data Specialist and Computer Operator update the DR.	DR is updated	3.5.1.6-1

Step	Duration	User	Operator Action	System	Figure
32	3 Time = 1233		The DAAC Data Specialist sends the data to the Instrument Team for further investigation.	DR is submitted	3.5.1.6-1
33	3 Time = 1236		The Production Monitor places a hold on future executions of the PGE	PGE is placed on hold.	

3.5.1.7 Postconditions

A DR has been closed and the PGE has been placed on hold from future executions. The data has been sent to the Instrument Team for further analysis.

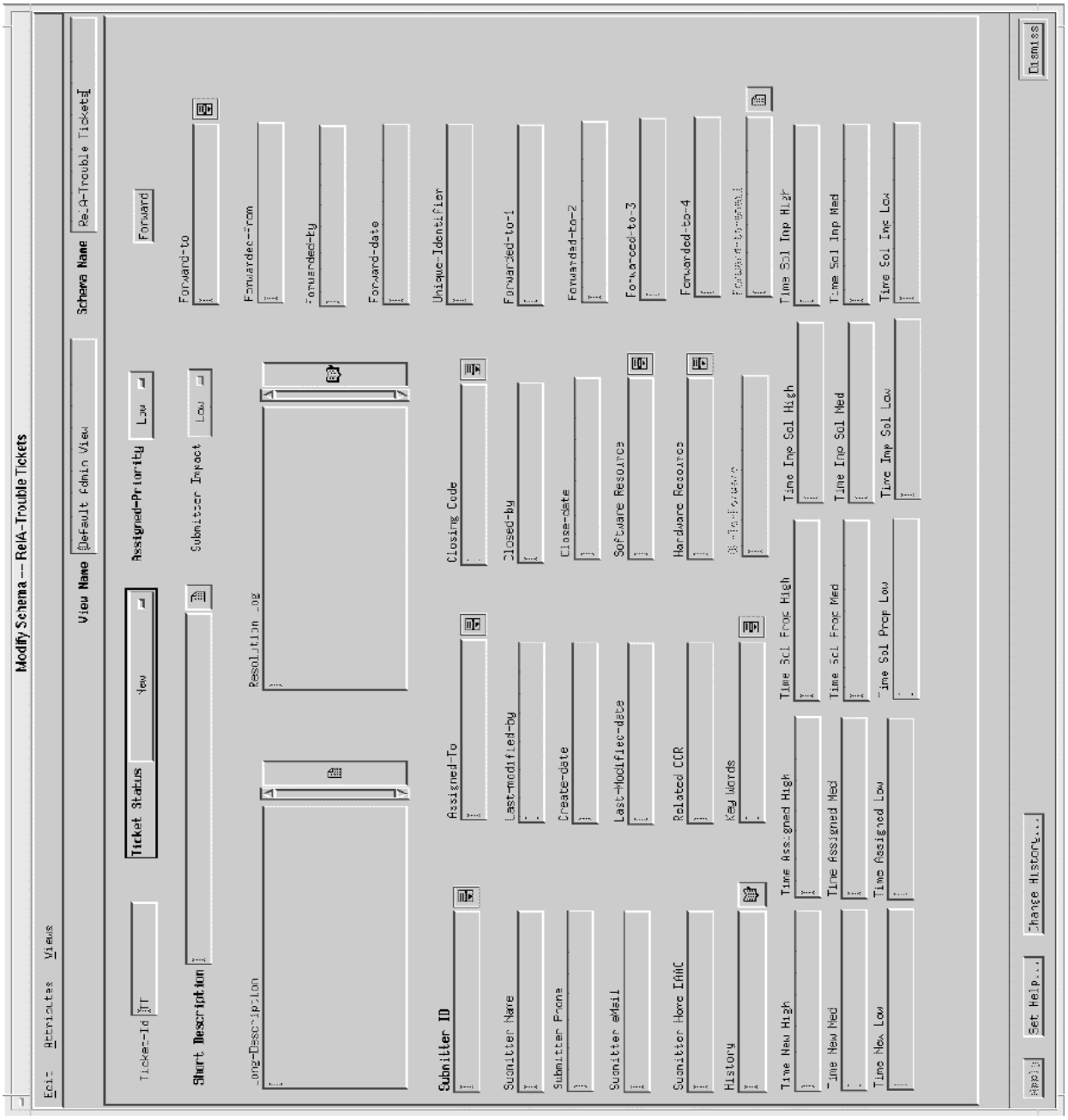


Figure 3.5.1.6-1. Remedy Trouble Ticket

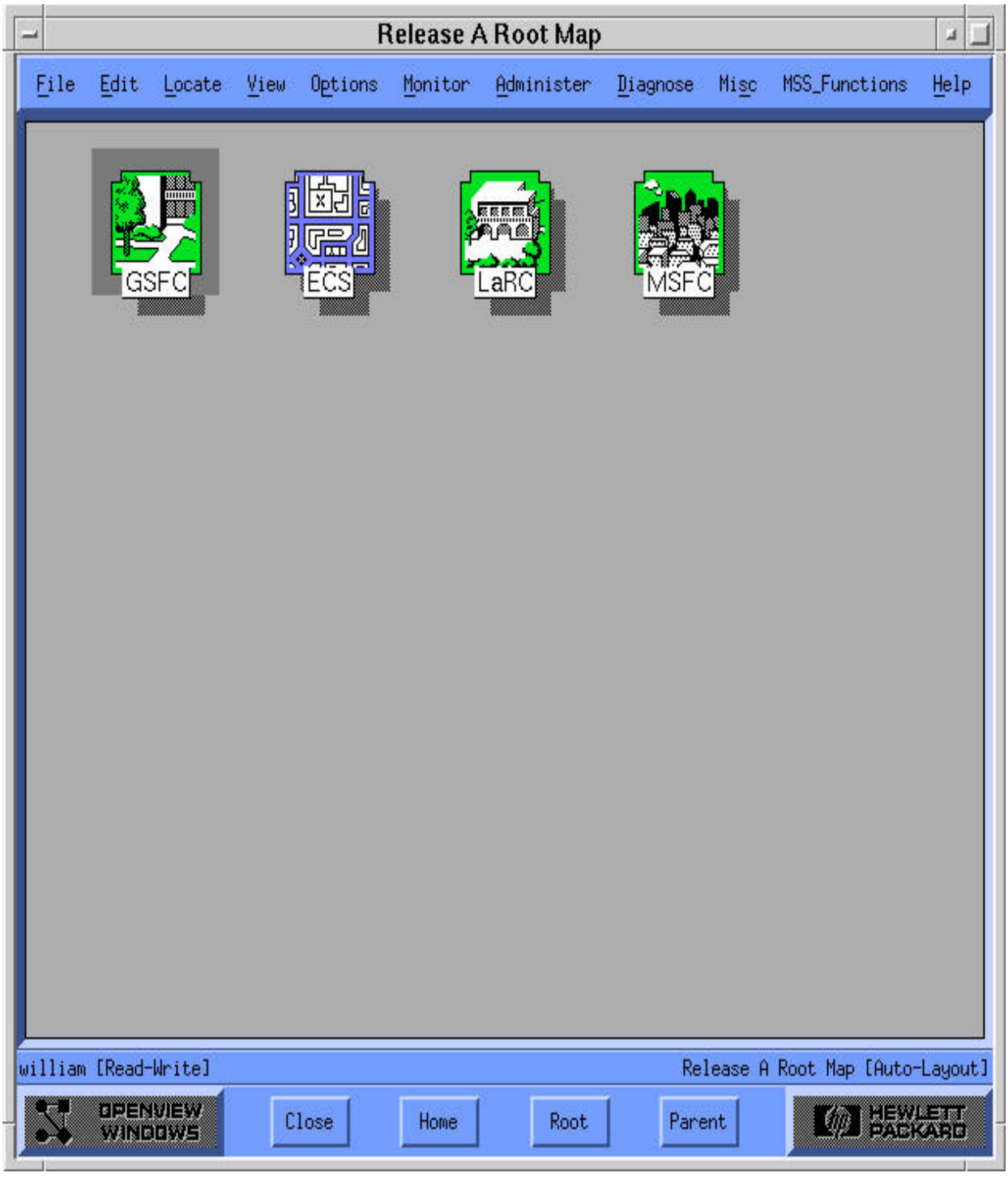


Figure 3.5.1.6-2. Release A Root Map

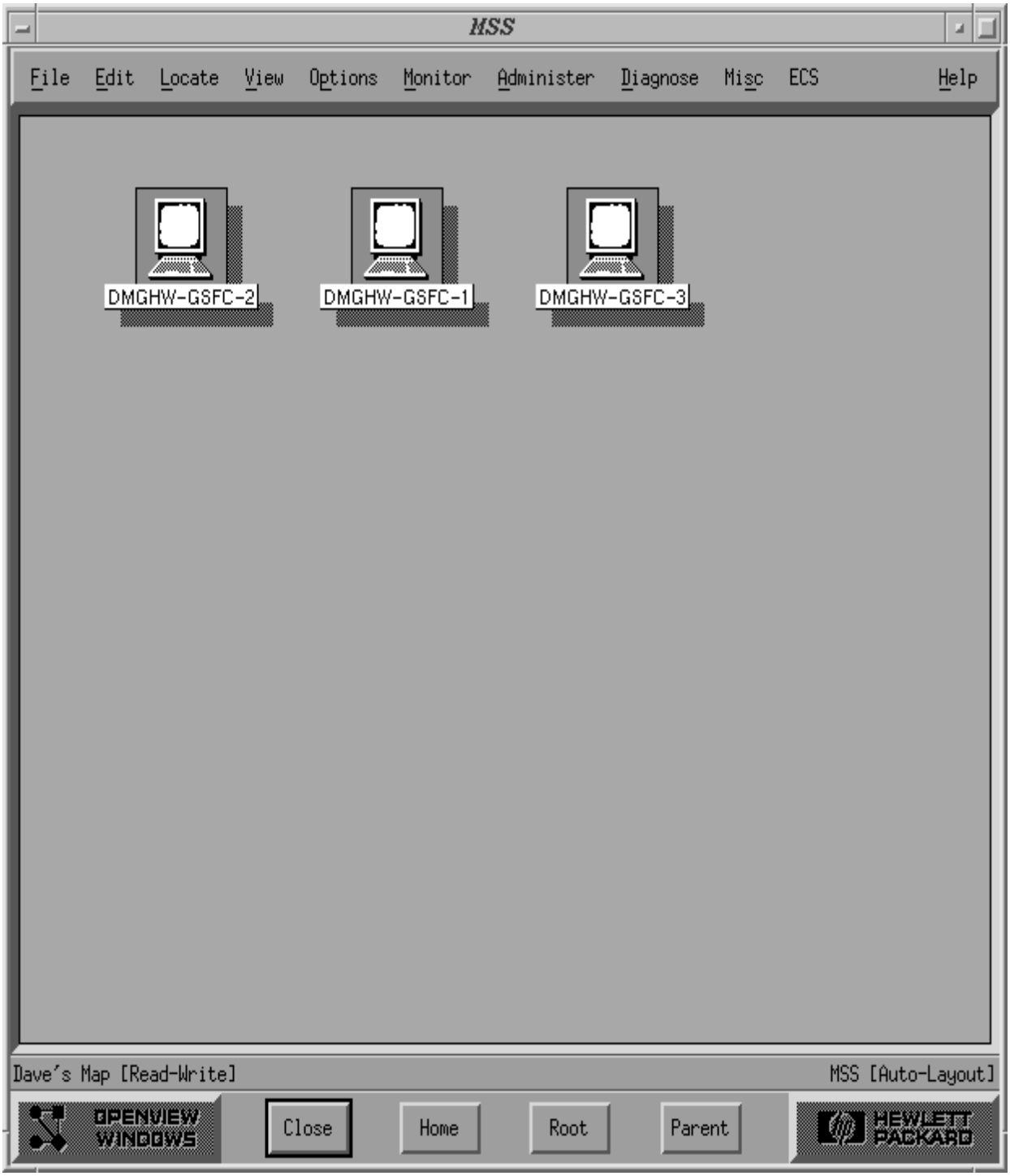


Figure 3.5.1.6-3. HP OpenView GSFC DMG Map

3.5.2 User Notes Performance Degradation

3.5.2.1 Scenario Description

This scenarios describes the situation in which an end-user notices and reports a performance degradation in the fulfillment of his request. The scenario demonstrates the some of the typical steps operations personnel might take in checking out and resolving the issue. Included are representative screen prints of some of the tools at the disposal of the operations personnel for looking into the performance issue. For more details regarding the Trouble Ticketing process, please see Scenario 3.2.1 Trouble Ticket and Problem Tracking Scenario.

3.5.2.2 Frequency

This scenario is expected to take place on an intermittent basis. It will probably occur most often when the system or network is under unusually high volume. Additionally it should be noted that the frequency should decrease as user understanding of the peak usage times of the system is built up. Actual frequency estimates will of this event will be given as numbers are available from the current (EP6) and future prototype packages.

3.5.2.3 Assumptions

The assumptions underlying this scenarios are as follows:

1. The performance degradation was not to a sufficient level to trigger a system generated fault. For an example of system generated faults and subsequent actions please refer to Scenario 3.3.1.
2. The user perceives that his browse request has taken an unusually long time to finish. However, for purposes of this scenario it is assumed that the browse request does eventually complete correctly (see step 12).
3. Trending Analysis can occur prior to or after the Trouble Ticket has been closed. Trending Analysis is dependent upon the individual problem.
4. All applicable users (i.e., user services) will be notified each time a change (or modification) is submitted to the Trouble Ticket.

3.5.2.4 Components

There are five components involved with this scenario: The Management Framework (HP-OpenView), the Event History Log Browser, Trouble Ticketing, the SDS (Science Data Server), and the Release A Search and Order Tool. Figure 3.5.2.4-1 indicates the interaction among these components.

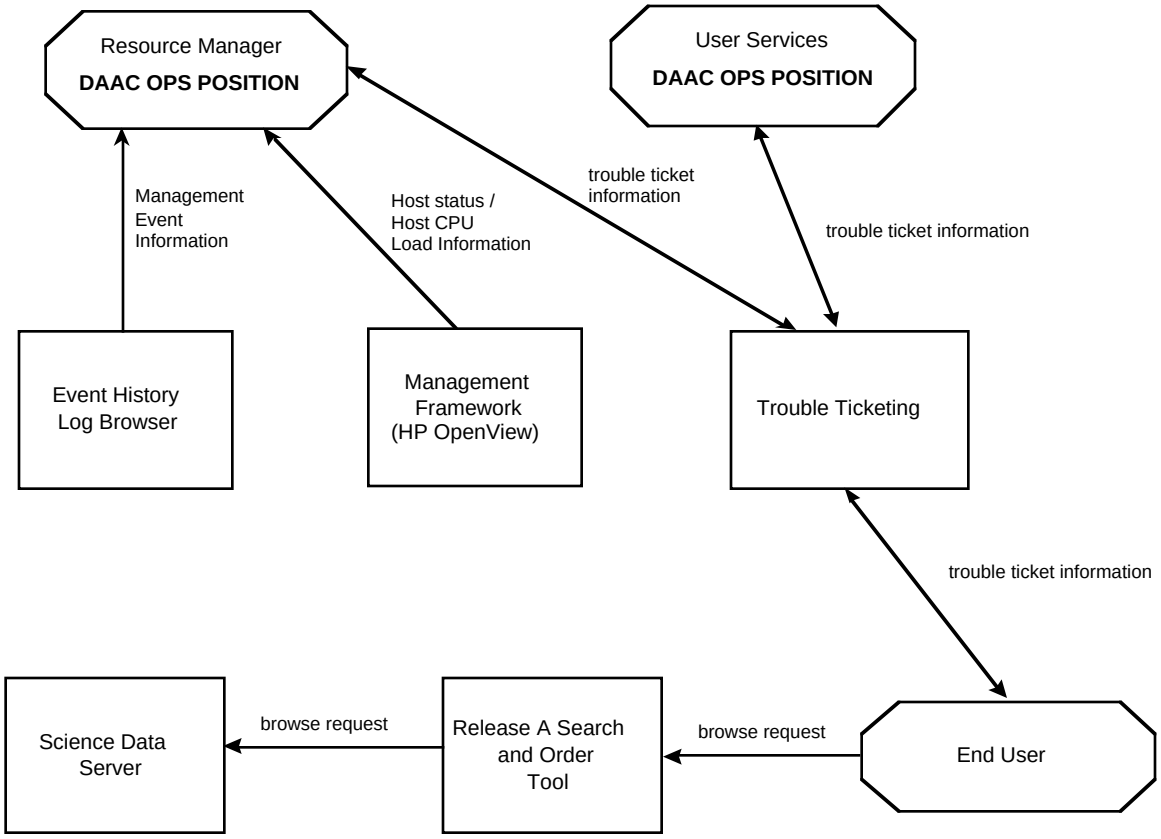


Figure 3.5.2.4-1. User Notes Performance Degradation Components

3.5.2.5 Preconditions

The preconditions for this scenario are as follows:

1. An unusually large number of requests are being placed on the Science Data Server.

3.5.2.6 Detailed Steps of Process

Table 3.5.2.6-1 represents the details of this scenario. The times and duration given are approximate.

Table 3.5.2.6-1. User Notes Performance Degradation Process (1 of 4)

Step	Time (mins)	User	Operator (User Services, Resource Manager)	ECS System	Figure
1	<1 Time = 1205	The User submits a request to browse a specified data product using the Release A Search and Order Tool.			
2	15 Time = 1206	User believes that the transaction has taken to much time and elects to call the user services group to discuss the problem.			
3	5 Time = 1221	User decides to submit a Trouble Ticket and selects the Trouble Ticketing icon from the ECS desktop.			
4	<1 Time = 1226			System (ECS Desktop) invokes user-preferred browser with Trouble Ticketing home page URL.	
5	<5 Time = 1227	User enters trouble ticket detailed information describing the fact that the browse request has taken a long time to fulfill and submits the Trouble Ticket.			
6	<1 Time = 1232			Trouble Ticketing System (Remedy) notifies User Services of the new Trouble Ticket.	

Step	Time (mins)	User	Operator (User Services, Resource Manager)	ECS System	Figure
7	<2 Time = 1233		User Services views the Trouble Ticket and assigns it to the Resource Manager.		
8	<2 Time = 1235		Resource Manager looks at the detail of the Trouble Ticket.		
9	25 Time = 1237		The Resource Manager sees that the potential performance problem is with the Science Data Server (SDS) application. He uses the “Locate” function on the HP OpenView menu to bring up the map containing the SDS managed host.		
10	<1 Time = 1302			System (HP OpenView) displays a map containing the SDS managed host. The host icon is green indicating that the host is up and functioning.	
11	<1 Time = 1303		The Resource Manager elects to first check the network activity on the SDS host. He chooses the “Interface Traffic” option from the HP OpenView menu.		
12	<1 Time = 1304	The User receives the results from his browse request.			
13	<1 Time = 1305			System (HP OpenView) displays an “Interface Traffic” graph containing : packets received, packets transmitted, errors received, and errors transmitted.	3.5.2.6-1

Step	Time (mins)	User	Operator (User Services, Resource Manager)	ECS System	Figure
14	<1 Time = 1306		The Resource Manager sees that the network activity does not show any sign on problems or an unacceptable level of activity. Therefore, the he elects to check the CPU load on the managed host.		
15	<1 Time = 1307		Selecting the managed host, the Resource Manager chooses the “CPU Load” option from the HP OpenView menu.		
16	<1 Time = 1308			System (HP OpenView) displays a “CPU Load” Graph containing the average CPU load on that host.	3.5.2.6-2
17	<1 Time = 1309		The Resource Manager selects the “Time Interval” option from the HP OpenView menu and scrolls back to the time period that the performance degradation was experienced.		
18	<1 Time = 1237			System (HP OpenView) displays shifts to display the specified time period. The graph indicates a raised level of average CPU load around the time of the transaction is question. However, the graph also indicates that the CPU load did not reach the currently configured threshold and soon dropped to a lower level of activity.	3.5.2.6-3

19	<2 Time = 1238		The Resource Manager elects to research the cause of the heightened CPU load. He accesses the Event History Log Browser. He specifies the SDS managed host name as well as an initial time frame encom-passing the transaction in question.		

Step	Time (mins)	User	Operator (User Services, Resource Manager)	ECS System	Figure
20	<3 Time = 1240			System (Event History Log Browser) retrieves and displays the events from this host for the specified time period. The list of events indicates an unusually large number of requests within a short time span.	3.5.2.6-4
21	<1 Time = 1243		In order to better narrow the event list, the Resource Manager select the “Filter” option from the Event History Log Browser. He specifies a more concise time frame as well as reducing the list to only those events logged by the Science Data Server.		
22	<1 Time = 1244			System (Event History Log Browser) displays the filtered list of events.	
23	<2 Time = 1245		The Resource Manager verifies that the performance degradation was indeed simply a fluctuation due to heightened numbers of requests.		
24	<5 Time = 1246		The Resource Manager updates the Trouble Ticket with the information he has obtained. The Trouble Ticket is later closed according the particular DAAC’s policy on closing trouble tickets.		
25	<1 Time = 1251	The User receives email notifying him/her of the TT being closed.			

3.5.2.7 Postconditions

The system is operating under normal conditions. At the specified time the MSS Management Data Access system will calculate and load the aggregate performance metrics of the Science Data Server to the Management Database. From this database, trend reports can be used to determine if any fault threshold parameters should be changed.

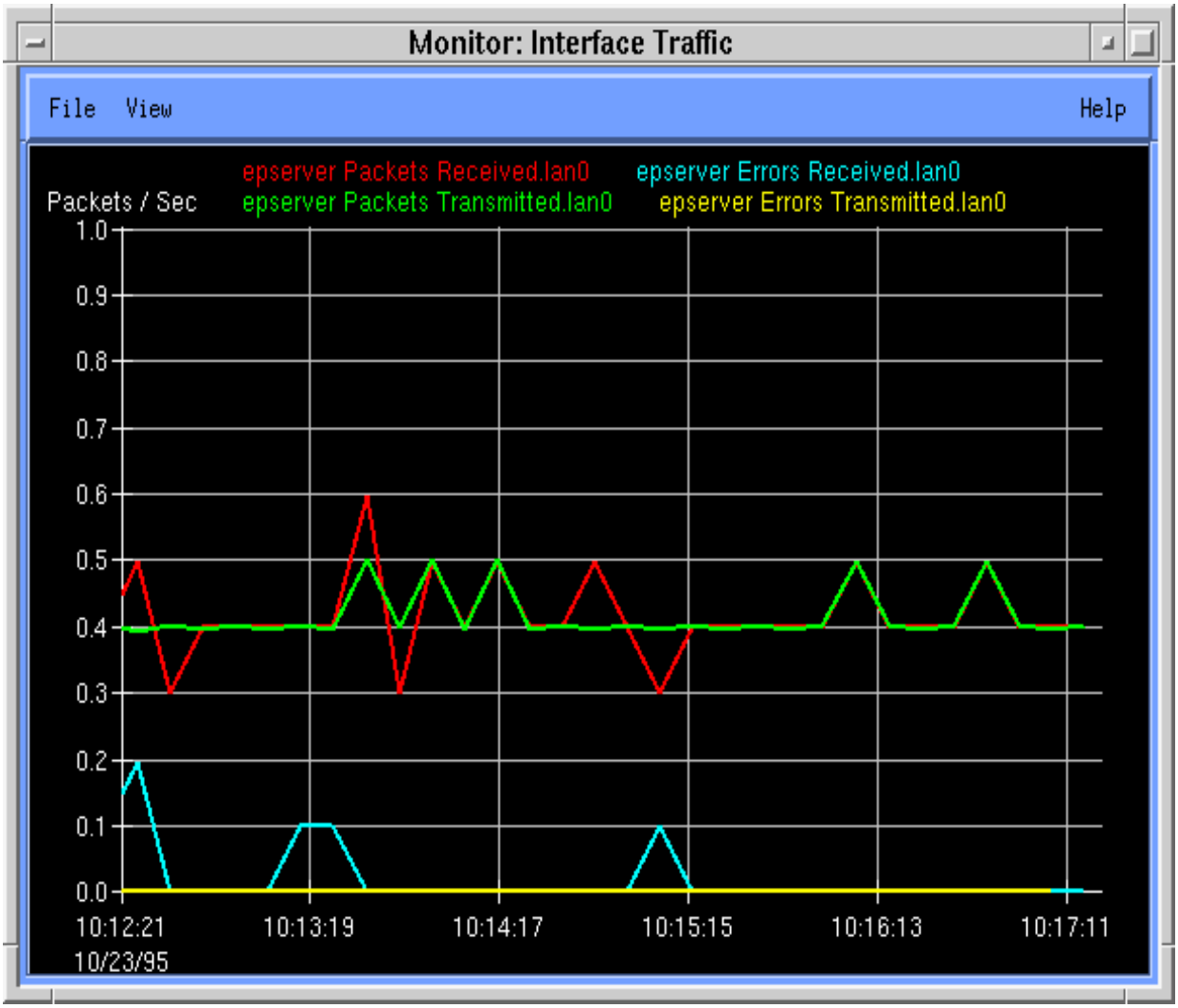


Figure 3.5.2.6-1. HP OpenView Interface Traffic

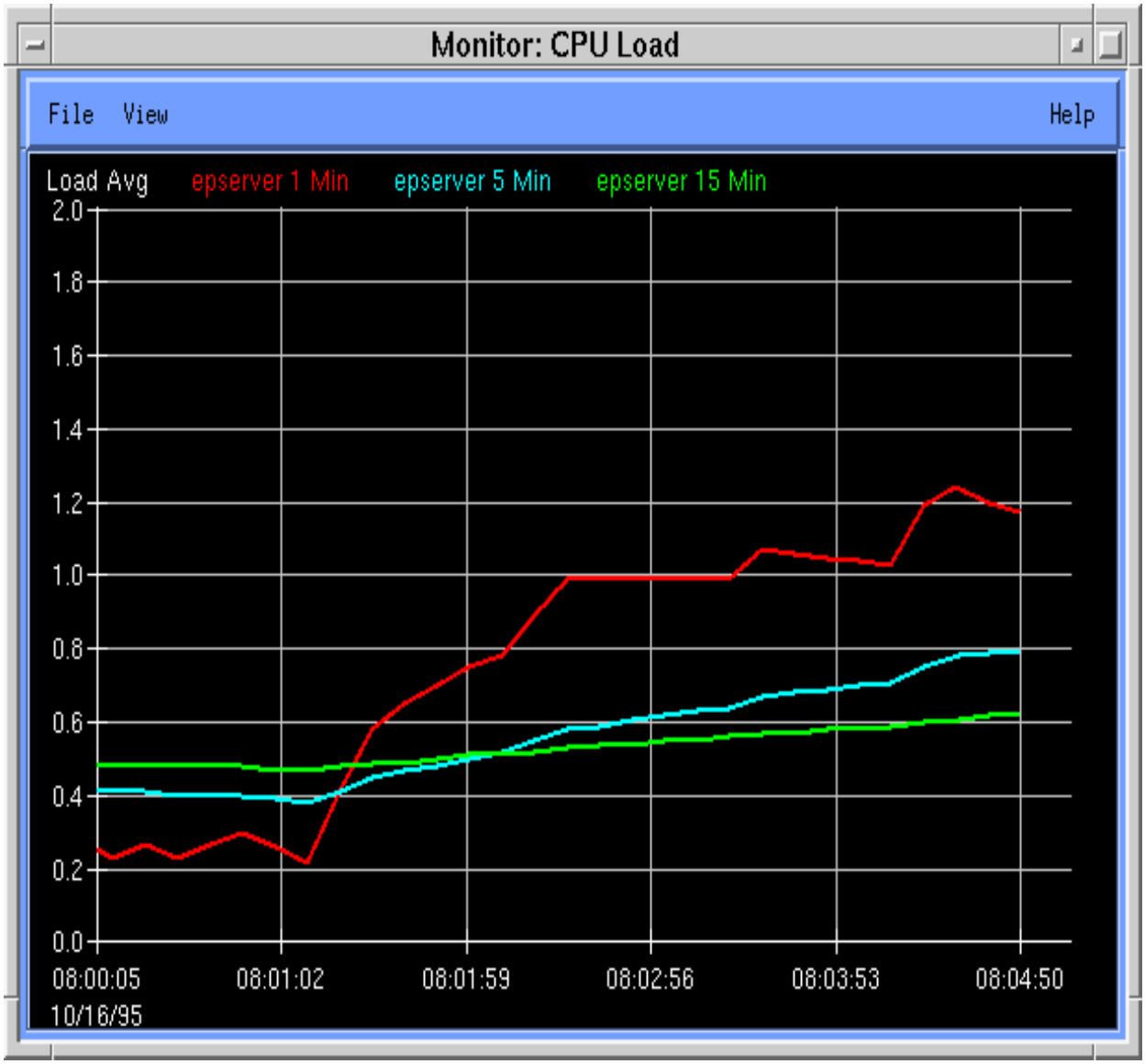


Figure 3.5.2.6-2. HP OpenView CPU Load

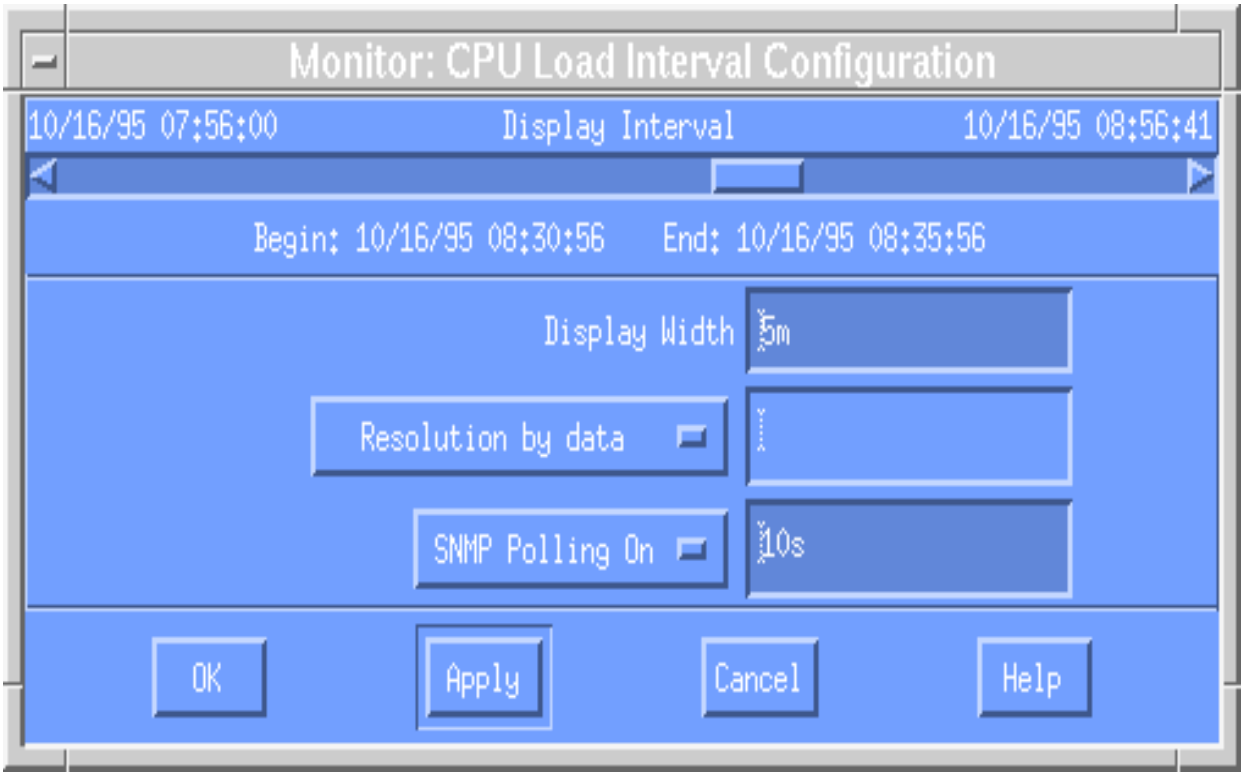


Figure 3.5.2.6-3. HP OpenView Interval Configurator

Figure 3.5.2.6-4. HP OpenView Log Browser

3.5.3 Preparing for New Algorithm Scenario

3.5.3.1 Scenario Description

In this scenario, the DAAC manager knows that a new science algorithm is becoming operational and would like to have the performance analyst closely monitor its performance. The performance analyst writes a script that automatically generates a performance report for the algorithm based on several key performance variables (run time, CPU utilization, and disk i/o's) and sends that report to the performance analyst. The system automatically generates a report the next morning and sends it to the performance analyst.

The performance analyst receives the report, evaluates it briefly, creates a summary, and takes it to the DAAC manager. The DAAC manager looks at the report and asks for memory utilization to be included as well. The performance analyst updates the management database query to include memory utilization data. The system automatically generates the updated report the next morning and sends it to the performance analyst.

The performance analyst receives the report, evaluates it briefly, creates a summary, and takes it to the DAAC manager. The DAAC manager looks at the report, decides that it provides all the necessary information, and asks to be sent a copy each morning. The performance analyst updates the script to send the report each morning to both the performance analyst and the DAAC manager. The system automatically generates the report the next morning and sends it to the performance analyst and the DAAC manager.

The ECS personnel involved are the performance analyst and DAAC manager.

3.5.3.2 Frequency

This scenario will be run whenever a new algorithm that needs to be carefully monitored comes on line.

3.5.3.3 Assumptions

This scenario is based on the following assumptions:

1. The relevant performance data for the algorithm has been logged and has been extracted into the management database.

3.5.3.4 Components

Figure 3.5.3.4-1 indicates the interaction between the DAAC personnel and the ECS subsystems.

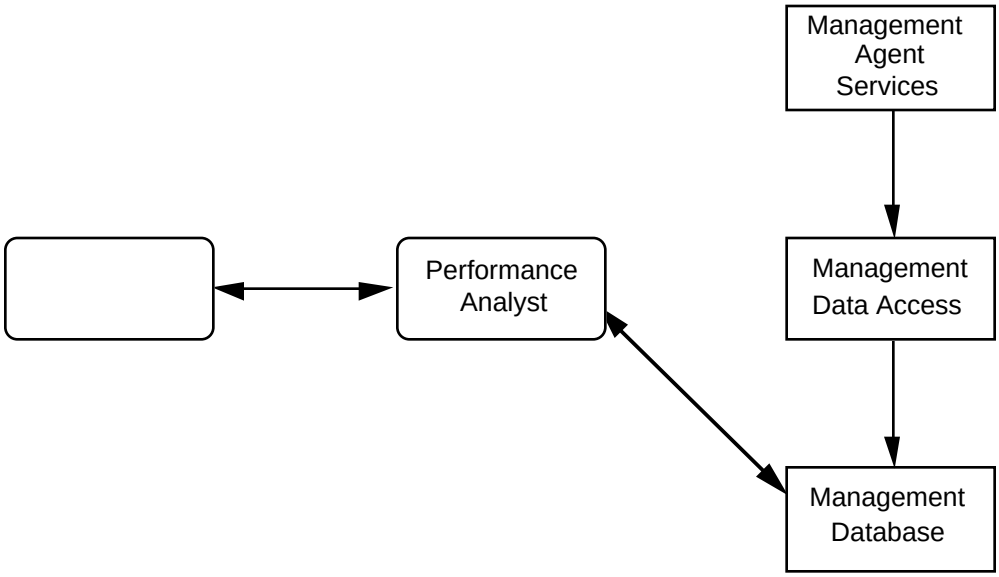


Figure 3.5.3.4-1. Preparing for New Algorithm Scenario Components

3.5.3.5 Preconditions

The algorithm performance metrics have been loaded into the management database for further analysis.

3.5.3.6 Detailed Steps of Process

Table 3.5.3.6-1 represents the details of this scenario. The times and duration given are approximate.

Table 3.5.3.6-1. Preparing for New Algorithm Process (1 of 2)

Step	Dur./Start Time (Mins.)	Operator Action	System	Figure
1	N/A	The DAAC manager is informed of a new algorithm that will be added in the near future. The DAAC manager asks the performance analyst to closely monitor the performance of the algorithm and to submit daily performance reports to the DAAC manager.		
2	N/A Time = 10:00		The algorithm becomes operational.	
3	15 Time = 1:00	The performance analyst generates a management database query to collect run times, CPU utilization, and disk i/o's for each PGE run (for this specific algorithm) over the past 24 hours. The performance analyst includes this query in a script that is to be automatically run each morning at 6:00 and sent to the performance analyst.		
4	2 Time = 6:00 (next day)		The system performs a query of the manage ment database, extract ing the specified perfor mance information for the PGE executions, and sends the perfor mance data to the performance analyst.	
5	60 Time = 8:00	The performance analyst evaluates the report and presents it along with a summary to the DAAC manager. The performance analyst also compares the values obtained by the query against average values obtained during algorithm integration and test.		
6	5 Time = 9:00	The DAAC manager looks at the report and asks for information on the memory utilization of each PGE as well.		
7	5 Time = 9:05	The performance analyst updates the report script to add memory utilization to the management database query.		

Table 3.5.3.6-1. Preparing for New Algorithm Process (2 of 2)

Step	Dur./Start Time (Mins.)	Operator Action	System	Figure
8	2 Time = 6:00 (next day)		The system performs a query of the management database, extracting the specified performance information for the PGE executions, and sends the performance data to the performance analyst.	
9	60 Time = 8:00	The performance analyst evaluates the report and presents it along with a summary to the DAAC manager. The performance analyst also compares the values obtained by the query against average values obtained during algorithm integration and test.		
10	5 Time = 9:00	The DAAC manager decides that the report provides the required information and asks to be sent a copy daily.		
11	5 Time = 9:05	The performance analyst updates the report script to send the daily report to the DAAC manager as well as the performance analyst.		
12	2 Time = 6:00 (next day)		The system performs a query of the management database, extracting the specified performance information for the PGE executions, and sends the performance data to the perfor-mance analyst and DAAC manager.	

3.5.3.7 Postconditions

The daily algorithm performance report is automatically generated each morning by the system and sent to the DAAC manager and the performance analyst.

3.5.4 Performance Trending Scenario

3.5.4.1 Scenario Description

In this scenario, the DAAC performance analyst (PA) performs a monthly network trend analysis for the DAAC. The performance analyst notices a slight increase in overall network utilization and

decides to investigate further. The performance analyst uses SQL scripts to generate network performance trend reports from information stored in the management database. The performance analyst saves the extracted data to file, imports the data in that file into the spreadsheet application, and generates graphical and text-based trend reports using the built-in spreadsheet capabilities. The performance analyst then reviews the reports, notices an anomaly in the data, and extracts additional data in an attempt to find its cause. The performance analyst examines the additional data, finds the cause, forwards the report to the DAAC manager for further use/action.

The ECS personnel involved are the performance analyst and DAAC manager.

3.5.4.2 Frequency

This scenario will be run whenever anomalies are detected in the monthly standard performance trending reports.

3.5.4.3 Assumptions

This scenario is based on the following assumptions:

1. Network performance data has been properly loaded into the management database by the management data access service.
2. The SQL script for generating the management database query is not a standard, predefined query (Note: This is only to provide an additional level of detail within this scenario. In most cases, the performance analyst will simply use a predefined query).

3.5.4.4 Components

Figure 3.5.4.4-1 indicates the interaction between the DAAC personnel and the ECS subsystems.

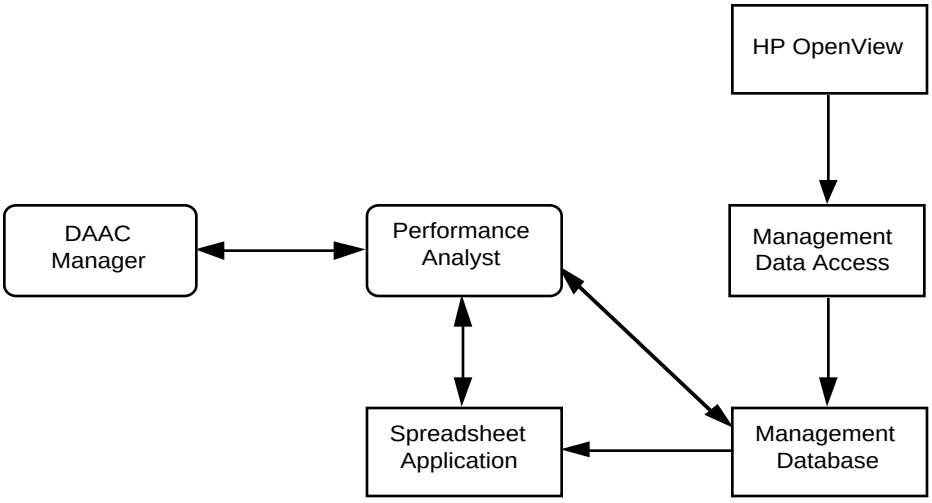


Figure 3.5.4.4-1. Performance Trending Scenario Components

3.5.4.5 Preconditions

The monthly performance metrics have been loaded into the management database for further analysis.

3.5.4.6 Detailed Steps of Process

Table 3.5.4.6-1 represents the details of this scenario. The times and duration given are approximate.

Table 3.5.4.6-1. Performance Trending Process (1 of 4)

Step	Dur./Start Time (Mins.)	Performance Analyst	System	Figure
1	5 Time = 6:00		A script is automatically run to generate the monthly network performance data for the DAAC.	
2	5 Time = 8:00	The performance analyst imports the monthly network performance data into a spreadsheet for analysis.	The spreadsheet application converts the data exported from the management database into a format compatible with the spreadsheet and enters the data in the spreadsheet cells.	
3	20 Time = 8:05	Using the spreadsheet package, the performance analyst creates tables listing the stored weekly values for those metrics retrieved from the database. The performance analyst then creates weekly trend predictions for the next six months for those same values using statistical trending functions provided in the spreadsheet application.	The spreadsheet application calculates future values for the performance metrics using statistical trending functions provided as part of the spreadsheet package.	
4	20 Time = 8:25	Using the spreadsheet package, the performance analyst creates graphical representations of the charts created in the previous step.	The spreadsheet application creates a line graph depicting both the actual data stored in the management database and the future values predicted by the spreadsheet for each of the network performance metrics. (Graphs for two metrics are shown.)	3.5.4.6-1 3.5.4.6-2
5	10 Time = 8:45	The performance analyst analyzes the network performance reports and notices that none of the metrics are projected to exceed critical thresholds in the forecast period. The performance analyst does notice two interesting changes on the network utilization report. First, the sustained drop in network utilization on IF-4 beginning in the 12/2 reporting period. Second, a one-period spike in network utilization and errors on IF-1.		

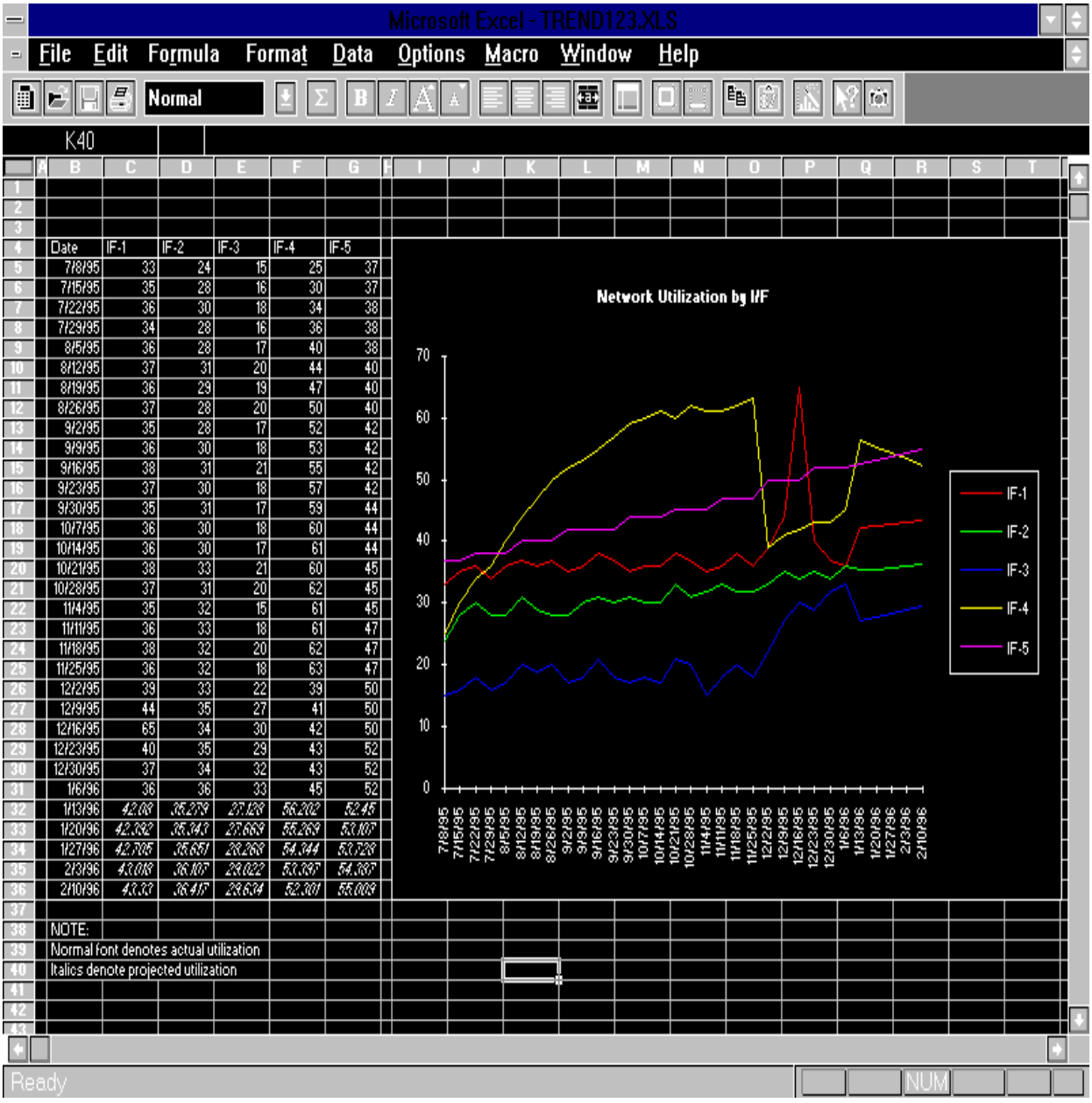
Step	Dur./Start Time (Mins.)	Performance Analyst	System	Figure
6	10 Time = 8:55	To determine the cause of the first change, the performance analyst uses the baseline manager to determine changes that were made to the system baseline during that period. Using the baseline manager, the performance analyst identifies a change in the baseline and notes the CCR numbers for the changes incorporated in that baseline from the previous baseline.	The baseline manager provides a list of the CCRs incorporated in the current and the prior version of the baseline. If required, previous versions of the baseline can be retrieved from the archive to provide this same information.	
7	10 Time = 9:05	The performance analyst then uses DDTS (see Section 3.4.7) to determine what each of the changes were. Within DDTS, the performance analyst discovers that the bandwidth for the external circuit was increased, resulting in a lower network utilization percentage.	DDTS provides a description for each of the CCRs identified.	
8	5 Time = 9:15	Since the change to the interface makes previous data invalid for forecasting network utilization, the performance analyst changes the weekly trend predictions to only use data gathered from 12/2 and later in forecasting network utilization. The graph is automatically updated.		3.5.4.6-3
9	5 Time = 9:30	To investigate the second change, the performance analyst creates a management query, specifying the time frame for which data is to be extracted (6 months), the metrics to be extracted (network utilization (on IF-1), number of products ordered), and the granularity of the data (weekly).		
10	5 Time = 9:35	The performance analyst runs the query on the management database.	The management database responds to the query with a report listing the stored performance data in tabular format.	
11	1 Time = 9:40	The performance analyst saves the report.	The system saves the file to disk.	

Step	Dur./Start Time (Mins.)	Performance Analyst	System	Figure
12	1 Time = 9:41	The performance analyst opens the spreadsheet package. The performance analyst then imports the data into a spreadsheet for further analysis.	The spreadsheet application converts the data exported from the management database into a format compatible with the spreadsheet and enters the data in the spreadsheet cells.	
13	10 Time = 9:42	Using the spreadsheet package, the performance analyst creates tables listing the stored weekly values for those metrics retrieved from the database. The performance analyst then creates weekly trend predictions for the next six months for those same values using statistical trending functions provided in the spreadsheet application.	The spreadsheet application calculates future values for the performance metrics using statistical trending functions provided as part of the spreadsheet package.	
14	10 Time = 9:52	Using the spreadsheet package, the performance analyst creates graphical representations of the charts created in the previous step.	The spreadsheet application creates a line graph depicting both the actual data stored in the management database and the future values predicted by the spreadsheet for each of the specified performance metrics.	3.5.4.6-4 3.5.4.6-5
15	15 Time = 10:02	The performance analyst reviews the generated report and notices a spike in the network utilization but not the number of products ordered. The performance analyst then creates a query to extract the number of products ordered by type over the same time period with the same granularity, extracts the data, and imports it into the spreadsheet application.	The management database responds to the query with a report listing the number of products ordered by type in tabular format.	
16	5 Time = 10:07	The performance analyst creates a graphical representation of the number of products ordered by data type.	The spreadsheet application creates a bar graph depicting the actual data stored in the management database for the number of products ordered by data type.	3.5.4.6-6

Step	Dur./Start Time (Mins.)	Performance Analyst	System	Figure
17	5 Time = 10:12	The performance analyst analyzes the bar graph and recognizes that an unusually high percentage of products ordered during that time period were sent via ftp, thus causing the increased network traffic over the external interface.		
18	5 Time = 10:17	The performance analyst appends an evaluation of the data to the performance trending report.		
19	5 Time = 10:22	The performance analyst forwards the report to the DAAC manager for further analysis and action.		

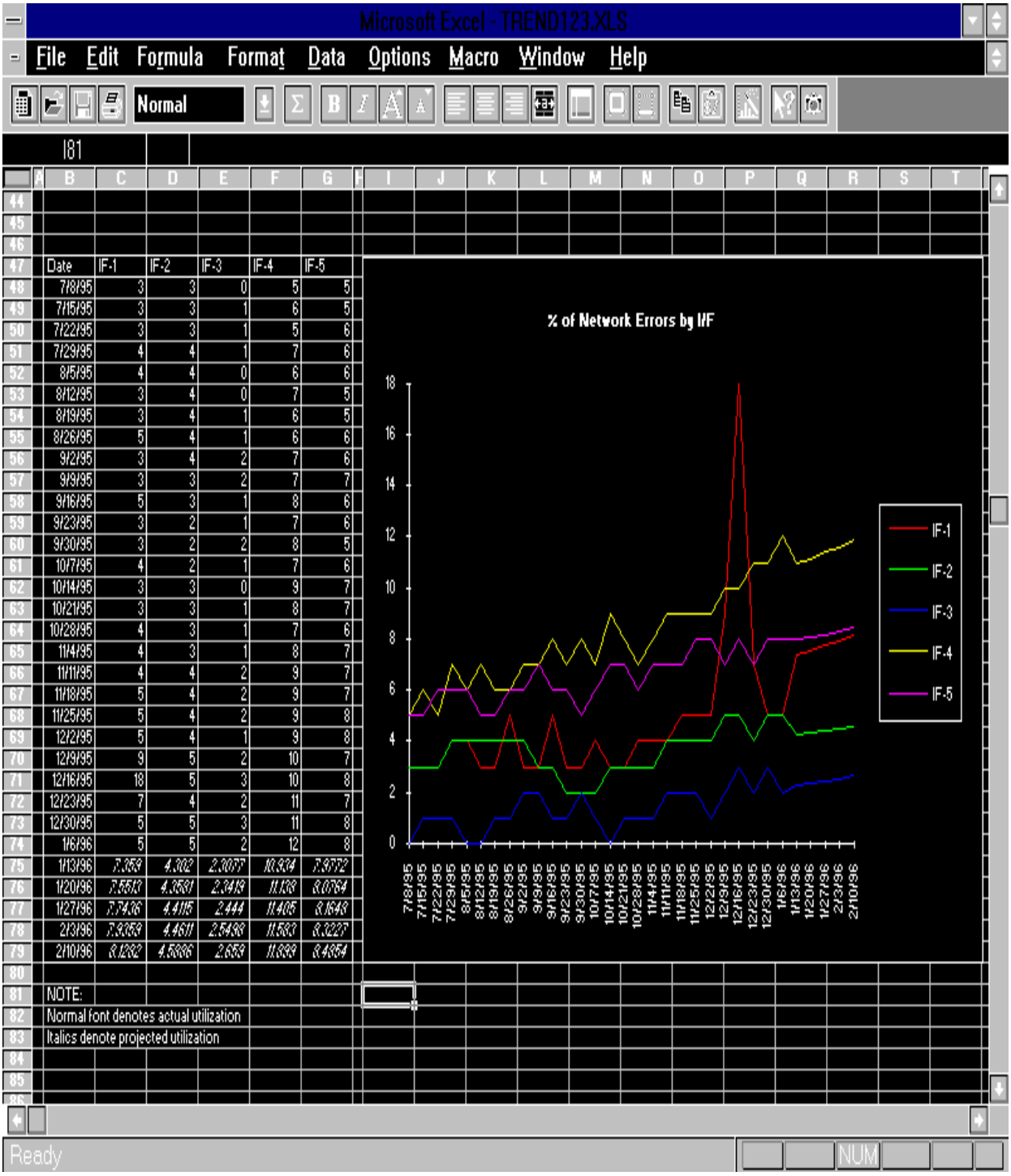
3.5.4.7 Postconditions

The performance trending data is presented in a report to management for consideration in determining the system upgrade status.



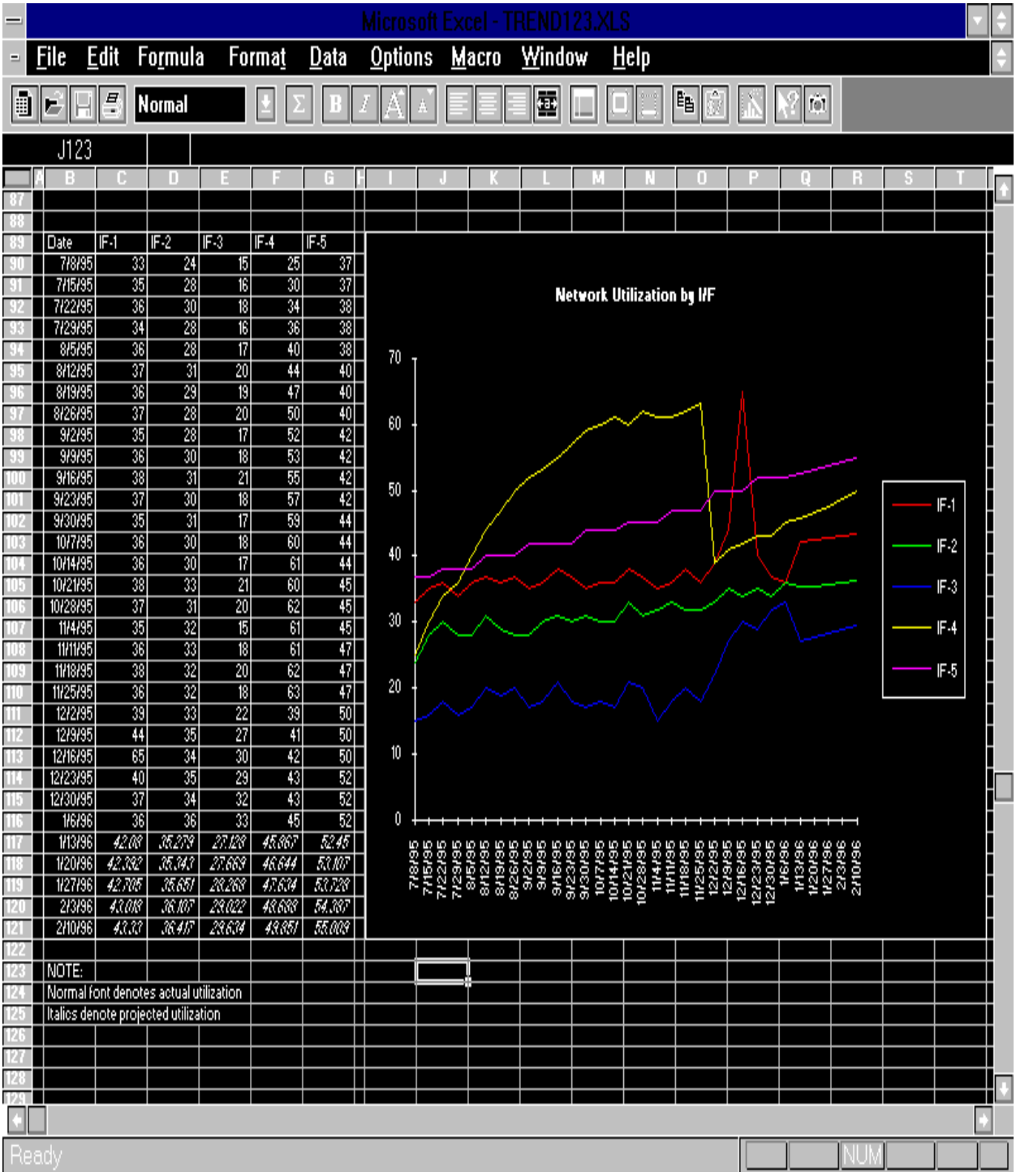
Date	IF-1	IF-2	IF-3	IF-4	IF-5
7/8/95	33	24	15	25	37
7/15/95	35	28	16	30	37
7/22/95	36	30	18	34	38
7/29/95	34	28	16	36	38
8/5/95	36	28	17	40	38
8/12/95	37	31	20	44	40
8/19/95	36	29	19	47	40
8/26/95	37	28	20	50	40
9/2/95	35	28	17	52	42
9/9/95	36	30	18	53	42
9/16/95	38	31	21	55	42
9/23/95	37	30	18	57	42
9/30/95	35	31	17	59	44
10/7/95	36	30	18	60	44
10/14/95	36	30	17	61	44
10/21/95	38	33	21	60	45
10/28/95	37	31	20	62	45
11/4/95	35	32	15	61	45
11/11/95	36	33	18	61	47
11/18/95	38	32	20	62	47
11/25/95	36	32	18	63	47
12/2/95	39	33	22	39	50
12/9/95	44	35	27	41	50
12/16/95	65	34	30	42	50
12/23/95	40	35	29	43	52
12/30/95	37	34	32	43	52
1/6/96	36	36	33	45	52
1/13/96	*42.08*	*35.279*	*27.128*	*56.202*	*52.46*
1/20/96	*42.382*	*35.343*	*27.669*	*55.269*	*53.107*
1/27/96	*42.705*	*35.651*	*28.268*	*54.344*	*53.728*
2/3/96	*43.018*	*36.107*	*28.022*	*53.367*	*54.367*
2/10/96	*43.33*	*36.417*	*28.634*	*52.301*	*55.008*

Figure 3.5.4.6-1. External Interfaces Network Utilization



Date	IF-1	IF-2	IF-3	IF-4	IF-5
7/8/95	3	3	0	5	5
7/15/95	3	3	1	6	5
7/22/95	3	3	1	5	6
7/29/95	4	4	1	7	6
8/5/95	4	4	0	6	6
8/12/95	3	4	0	7	5
8/19/95	3	4	1	6	5
8/26/95	5	4	1	6	6
9/2/95	3	4	2	7	6
9/9/95	3	3	2	7	7
9/16/95	5	3	1	8	6
9/23/95	3	2	1	7	6
9/30/95	3	2	2	8	5
10/7/95	4	2	1	7	6
10/14/95	3	3	0	9	7
10/21/95	3	3	1	8	7
10/28/95	4	3	1	7	6
11/4/95	4	3	1	8	7
11/11/95	4	4	2	9	7
11/18/95	5	4	2	9	7
11/25/95	5	4	2	9	8
12/2/95	5	4	1	9	8
12/9/95	9	5	2	10	7
12/16/95	18	5	3	10	8
12/23/95	7	4	2	11	7
12/30/95	5	5	3	11	8
1/6/96	5	5	2	12	8
1/13/96	*7.359*	*4.302*	*2.3077*	*10.304*	*7.8772*
1/20/96	*7.5517*	*4.3581*	*2.3419*	*11.138*	*8.0764*
1/27/96	*7.7436*	*4.4115*	*2.444*	*11.405*	*8.1648*
2/3/96	*7.9359*	*4.4611*	*2.5498*	*11.583*	*8.3227*
2/10/96	*8.1282*	*4.5086*	*2.653*	*11.899*	*8.4854*

Figure 3.5.4.6-2. External Interfaces Percentage of Network Errors



Date	IF-1	IF-2	IF-3	IF-4	IF-5
7/8/95	33	24	15	25	37
7/15/95	35	28	16	30	37
7/22/95	36	30	18	34	38
7/29/95	34	28	16	36	38
8/5/95	36	28	17	40	38
8/12/95	37	31	20	44	40
8/19/95	36	29	19	47	40
8/26/95	37	28	20	50	40
9/2/95	35	28	17	52	42
9/9/95	36	30	18	53	42
9/16/95	38	31	21	55	42
9/23/95	37	30	18	57	42
9/30/95	35	31	17	59	44
10/7/95	36	30	18	60	44
10/14/95	36	30	17	61	44
10/21/95	38	33	21	60	45
10/28/95	37	31	20	62	45
11/4/95	35	32	15	61	45
11/11/95	36	33	18	61	47
11/18/95	38	32	20	62	47
11/25/95	36	32	18	63	47
12/2/95	39	33	22	39	50
12/9/95	44	35	27	41	50
12/16/95	65	34	30	42	50
12/23/95	40	35	29	43	52
12/30/95	37	34	32	43	52
1/6/96	36	36	33	45	52
1/13/96	*42.08*	*35.279*	*27.128*	*45.867*	*52.45*
1/20/96	*42.392*	*35.743*	*27.663*	*46.644*	*53.107*
1/27/96	*42.705*	*36.651*	*28.268*	*47.674*	*53.728*
2/3/96	*43.018*	*36.107*	*29.022*	*48.668*	*54.387*
2/10/96	*43.33*	*36.417*	*29.634*	*49.651*	*55.003*

NOTE:
Normal font denotes actual utilization
Italics denote projected utilization

Figure 3.5.4.6-3. Updated External Interfaces Network Utilization

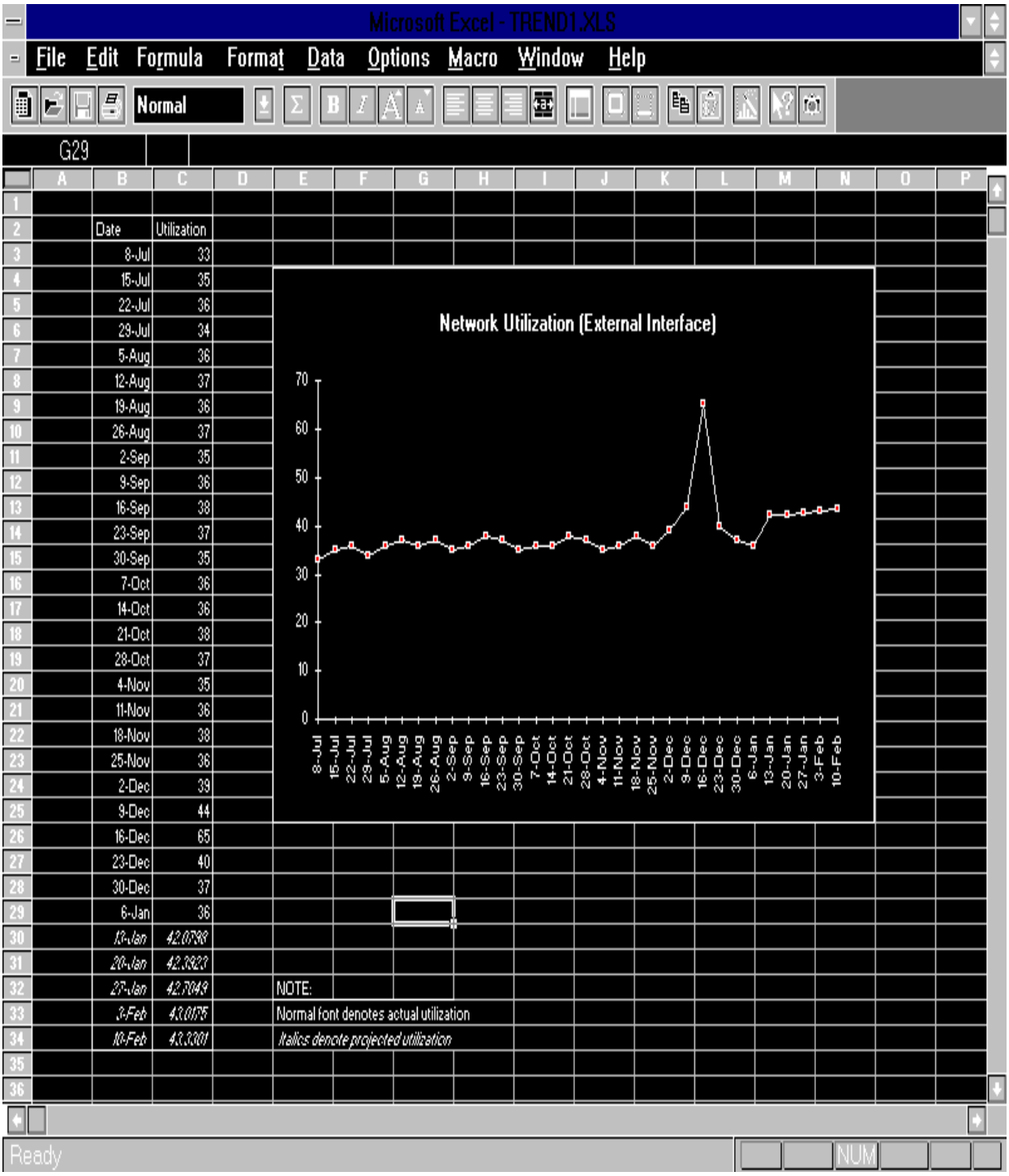


Figure 3.5.4.6-4. IF-1 Network Utilization Screen

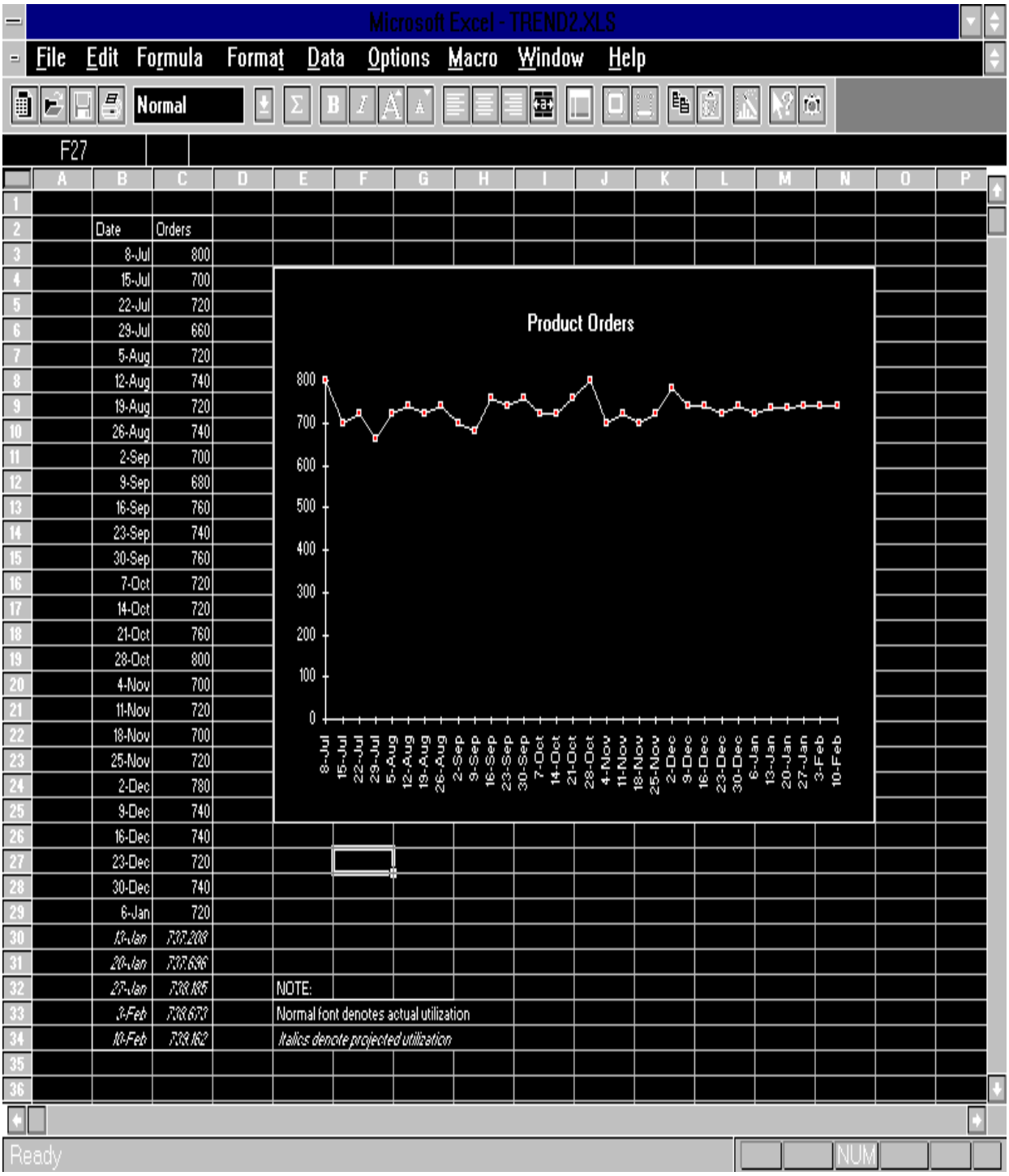
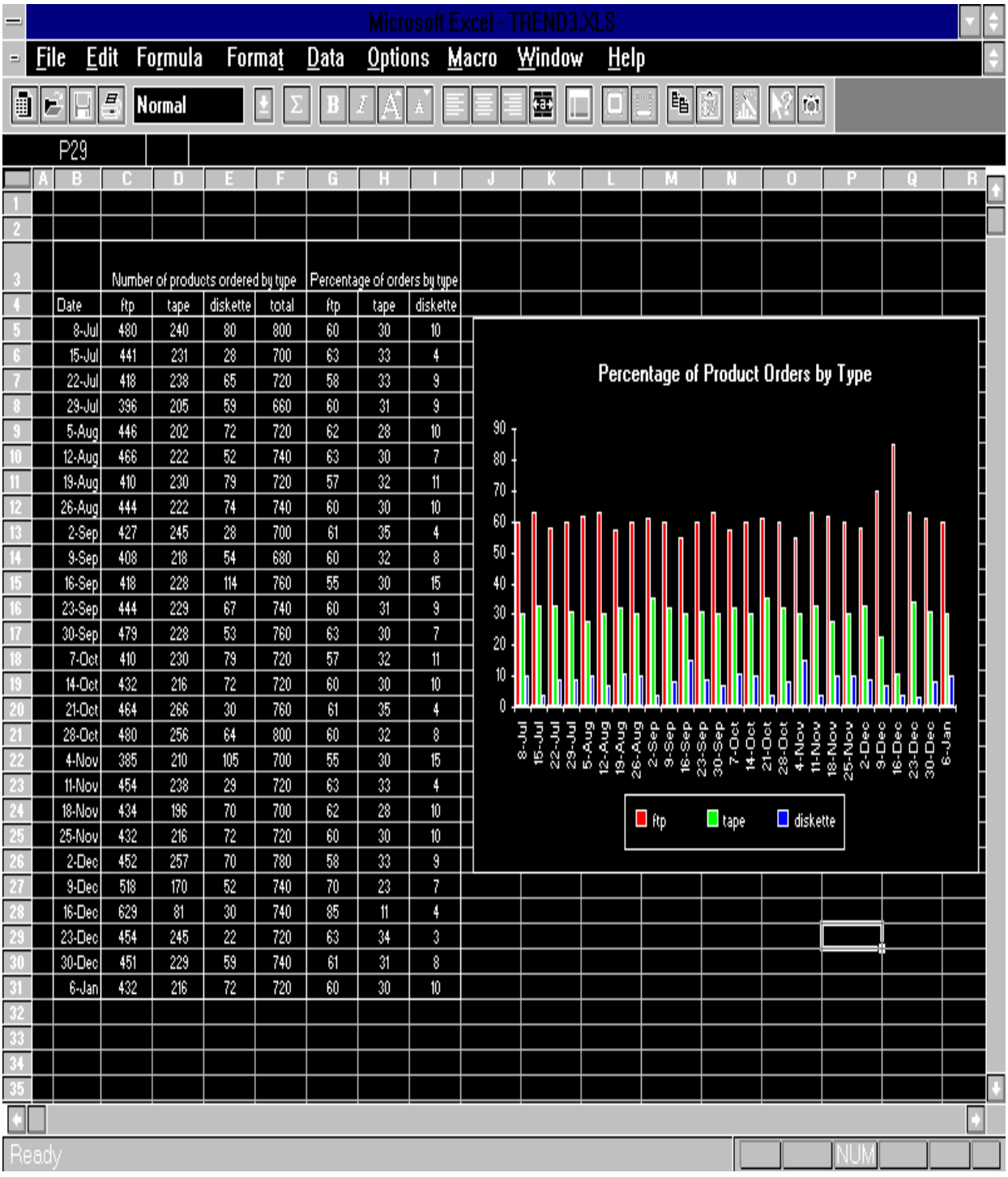


Figure 3.5.4.6-5. Number of Products Ordered Screen



	Number of products ordered by type				Percentage of orders by type		
Date	ftp	tape	diskette	total	ftp	tape	diskette
8-Jul	480	240	80	800	60	30	10
15-Jul	441	231	28	700	63	33	4
22-Jul	418	238	65	720	58	33	9
29-Jul	396	205	59	660	60	31	9
5-Aug	446	202	72	720	62	28	10
12-Aug	466	222	52	740	63	30	7
19-Aug	410	230	79	720	57	32	11
26-Aug	444	222	74	740	60	30	10
2-Sep	427	245	28	700	61	35	4
9-Sep	408	218	54	680	60	32	8
16-Sep	418	228	114	760	55	30	15
23-Sep	444	229	67	740	60	31	9
30-Sep	479	228	53	760	63	30	7
7-Oct	410	230	79	720	57	32	11
14-Oct	432	216	72	720	60	30	10
21-Oct	464	266	30	760	61	35	4
28-Oct	480	256	64	800	60	32	8
4-Nov	385	210	105	700	55	30	15
11-Nov	454	238	29	720	63	33	4
18-Nov	434	196	70	700	62	28	10
25-Nov	432	216	72	720	60	30	10
2-Dec	452	257	70	780	58	33	9
9-Dec	518	170	52	740	70	23	7
16-Dec	629	81	30	740	85	11	4
23-Dec	454	245	22	720	63	34	3
30-Dec	451	229	59	740	61	31	8
6-Jan	432	216	72	720	60	30	10

Figure 3.5.4.6-6. Number of Products Ordered by Data Type Screen